

REMARKS

Status of Claims

Claims 1-5 and 11-17 are pending and now stand rejected. In this response, claims 1, 2, 11-15 and 17 are amended and new claim 18 is added.

Support for Claim Amendments

Claims 1 and 11 are amended to recite “a light irradiation source comprising a lamp which irradiates light with uniform intensity to the sample contained in the reaction tube, a condensing lens, an optical waveguide which has an open structure with a reflective mirror that alters light path at both ends of the optical waveguide, an infra-red cutting filter cutting infra-red from the lamp and a selective transmission filter for transmitting light selectively to monitor a reaction progress.” Support for this amendment is found at least at p. 7 line 31 – p. 8 line 8 (“...a light irradiation source part comprising a lamp (5) which irradiates the light with uniform intensity of a sample contained in the reaction tube, a Infra-Red cutting filter (6) cutting Infra-Red from the lamp, an optical waveguide (8) and a first focusing lens (10) for obtaining uniform light beam of the light from the lamp in a wide area, a selective transmission filter (9) for transmitting light selectively to monitor a reaction progress selectively...” and in Figure 1 (see mirrors 7 and 11 at each end of optical waveguide 8).

The remaining amended claims were amended to eliminate reference numerals.

Support for new claim 18 is found at least at p. 13 lines 9-14 (“...a plane wave light source of the present invention with uniformly distributed intensity over the cross-section of light beam has more than 85% (21) of light intensity at the edges compared with the light intensity in the center of reaction tube plate(34)...” and in Figures 1 and 3.

Accordingly, no new matter is introduced by these amendments.

Claim Rejections – 35 U.S.C. §103

Claims 1-5 and 11-17 stand rejected under 35 U.S.C. §103(a) as obvious over Applicants' Admitted Prior Art and De Maeyer (U.S. Patent no. 4,076,420). In light of the foregoing claim amendments and the arguments presented below, Applicants respectfully traverse these rejections.

To establish an obviousness rejection under 35 U.S.C. § 103(a), four factual inquiries must be examined. The four factual inquiries include (a) determining the scope and contents of the prior art; (b) ascertaining the differences between the prior art and the claims in issue; (c) resolving the level of ordinary skill in the pertinent art; and (d) evaluating evidence of secondary consideration. *Graham v. John Deere*, 383 U.S. 1, 17-18 (1966). In view of these four factors, the analysis supporting a rejection under 35 U.S.C. 103(a) should be made explicit, and should "identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. *KSR Int'l. Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1741 (2007). Furthermore, even if the prior art elements may be combined, there must be a reasonable expectation of success, and the reference or references, when combined, must disclose or suggest all of the claim limitations. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In view of this framework, Applicants respectfully submit that independent claims 1 and 11 are not obvious under 35 U.S.C. §103(a) because De Maeyer does not disclose, teach or suggest every feature of claims 1 and 11. More specifically, De Maeyer at least fails to disclose "an optical waveguide which has an open structure with a reflective mirror that alters light path at both ends of the optical waveguide." In the outstanding Office Action, the Examiner states that certain features relied upon in the previous response, such as "the waveguide having an open structure ... are not recited in the rejected claim(s)." Accordingly, Applicants have amended the independent claims to clarify that the optical waveguide has an open structure with a reflective mirror at either end of the optical waveguide. De Maeyer, by contrast, does not disclose an optical waveguide with an open structure because each end of the "flexible light pipe" of De Maeyer is connected to a monochromator with exit slits. See De Maeyer col. 9, lines 20-34 and

FIG. 3.

The difference in the structures of Applicants' claimed waveguide and De Maeyer's flexible light pipe are notable because Applicants' claimed structure provides superior functionality over De Maeyer. Applicants' claimed structure minimizes the size of the waveguide and also output light that fits the size of the reaction tube plate. See p. 13 lines 25-27 ("...plane wave light beam with a round-type cross-section are adjusted to the shape of the rectangular reaction tube plate(34)...") and FIG. 5. This is substantially distinct from *De Maeyer* because, in order to apply the light pipe of *De Maeyer* to the apparatus as claimed by Applicants, the size of light pipe should be as large as that of the actual reaction plate, for example, a 96-well plate. That is, such a flexible light tube of *De Maeyer* having the size required for use in Applicants' claimed apparatus is technically impossible.

It is further pointed out that the light waveguide as claimed by Applicants is used to provide uniform light intensity, thereby providing a capability of monitoring the biological reaction progress with uniform sensitivity over the whole reaction plate area. This is distinguished from the *De Maeyer* apparatus in that the light pipe of *De Maeyer* is used simply for light transmission. That is, with reference to the detailed description of *De Maeyer*, when the light source A' and the monochromator M' is omitted in Fig. 3, flexible UV-transmitting light-pipe G is connected between movable exit slit and monochromator slit S', using the light pipe as a light path, and not to provide uniform intensity. See De Maeyer col. 9, lines 20-34.

Accordingly, De Maeyer fails to disclose "an optical waveguide which has an open structure with a reflective mirror that alters light path at both ends of the optical waveguide." As explained above, the claimed waveguide structure provides superior functionality, namely a smaller and simpler device that provides uniform light intensity. Therefore, as this feature of independent claims 1 and 11 is not disclosed, either explicitly or implicitly, by the De Maeyer reference, Applicants respectfully request that these rejections be withdrawn. Furthermore, as each of the remaining claims depends from claim 1 or 11, the rejections of these claims should be withdrawn as well.

Additionally, new claim 18 requires “wherein the reaction tubes are disposed on a reaction tube plate having edges and a center, and wherein the edges of the reaction tube plate receive light with at least 85% of the intensity of light received at the center of the reaction tube plate.” In the outstanding Office Action, the Examiner states that the feature of “more than 85% of light intensity in the center of the reaction tube plate ... [is] not recited in the rejected claim(s).” This “at least 85%” feature is now explicitly claimed in new claim 18. De Maeyer does not disclose this type of uniform light intensity illuminating a reaction tube plate. Accordingly, claim 18 should be allowed both because it depends from claim 1 and because the “at least 85%” feature is not found in De Maeyer.

SUMMARY

In light of the foregoing, Applicant submits that the application is now in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicant respectfully requests that the Examiner contact the undersigned attorney at (858) 777-8281, or at bgifford@nathlaw.com, if it is believed that such contact will expedite prosecution.

In the event this paper is not timely filed, Applicant petitions for an appropriate extension of time. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.


Respectfully submitted,

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July 26, 2010

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Attorney Docket No. **27024U**


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